

**A MIX-METHODOLOGICAL ASSESSMENT OF
COMMUNITY PHARMACISTS' PERCEPTION
TOWARDS ONLINE HEALTH INFORMATION
IN FEDERAL TERRITORY OF KUALA
LUMPUR, MALAYSIA**

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UNIVERSITI SAINS MALAYSIA

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LUMPUR, MALAYSIA**

by

ONG SEE WAN

**Thesis submitted in fulfilment of the requirement
for the degree of
Master of Science**

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LIST OF ABBREVIATIONS

ADR	Adverse Drug Reaction
ASHP	American Society of Health-System Pharmacists
BMJ	British Medical Journal
BNF	British National Formulary
CDC	U.S. Centers for Disease Control
CME	Continuing Medical Education
CP	Community Pharmacist
CPD	Continuing Professional Development
CPE	Continuous Pharmaceutical Education
CPG	Clinical Practice Guidelines
FDA	U.S. Food and Drug Administration
GP	General Practitioner
Hi-Ethics	Health Internet Ethics
HIV	Human Immunodeficiency Virus
HON	Health on the Net
HSDB	Hazardous Substances Data Bank
KL	Kuala Lumpur
KS	Kolmogorov-Smirnov
MAKNA	National Cancer Council Malaysia
MCMC	Malaysian Communications and Multimedia Commission
MCPG	Malaysian Community Pharmacist Guild
MeSH	Medical Subject Headings
MOH	Ministry of Health

MPS	Malaysian Pharmaceutical Society
MREC	Medical Research and Ethics Committee
NCCN	National Comprehensive Cancer Network
NICE	National Institute for Health and Care Excellence
NIH	National Institutes of Health
NMRR	National Medical Research Register
NPRA	National Pharmaceutical Regulatory Agency
ODS	Office of Dietary Supplement
OTC	Over-the-counter
SIGN	Scottish Intercollegiate Guideline
SPSS	Statistical Package for Social Science
TOXNET	Toxicology Data Network
UK	United Kingdom
URAC	Utilization Review Accreditation Commission
URL	Uniform Resource Locator
U.S.	United States
USM	Universiti Sains Malaysia
WHO	World Health Organization
WWW	World Wide Web

**PENILAIAN MENGENAI PERSEPSI AHLI FARMASI KOMUNITI DI
WILAYAH PERSEKUTUAN KUALA LUMPUR, MALAYSIA TERHADAP
MAKLUMAT KESIHATAN DALAM TALIAN DENGAN METODOLOGI
BERBENTUK CAMPURAN**

ABSTRAK

Internet merupakan alat biasa yang digunakan oleh anggota kesihatan dan orang ramai untuk mendapatkan maklumat kesihatan yang terkini untuk meningkatkan pengetahuan mereka. Kajian menunjukkan peningkatan penggunaan Internet oleh pegawai perubatan, namun kekurangan informasi dilaporkan di antara ahli farmasi komuniti (AFK). Sehubungan itu, kajian ini dicadangkan untuk memberi pemahaman semasa dan masa hadapan tentang penggunaan Internet untuk maklumat kesihatan di kalangan AFK di Malaysia. Matlamat kajian: (i) menilai persepsi AFK tentang maklumat kesihatan yang diperolehi dari Internet; (ii) mengenalpasti jenis aktiviti profesional atau maklumat kesihatan dalam talian yang dicari oleh AFK ; dan (iii) menyiasat halangan yang dihadapi apabila mencari maklumat kesihatan dalam talian. Metodologi berbentuk campuran ‘sequential exploratory mixed-methodology’ telah digunakan dalam kajian ini, di mana fasa-pertama adalah kajian kualitatif manakala kuantitatif bagi fasa-kedua, menyasarkan AFK beramal di Kuala Lumpur, Malaysia. Kajian kualitatif menggunakan temubual bersemuka. Teknik pensampelan secara bertujuan dan bola salji digunakan untuk merekrut peserta. Dengan persetujuan peserta, temubual akan dirakam, ditranskrip secara kata-demi-kata dan dianalisis mengikut tema. Fasa-pertama melibatkan 11 peserta dan empat tema utama dikenalpasti. Peserta memaklumkan bahawa maklumat kesihatan dalam talian adalah berguna dan mudah diakses, dan berpendapat bahawa Internet adalah sumber yang unik. Walau bagaimanapun, maklumat harus diperolehi daripada sumber dalam talian

yang mantap. Mereka menyatakan keperluan latihan mengenai pencarian maklumat dan penilaian laman sesawang serta senarai laman sesawang yang bertaualiah. Halangan ditemui berkorelasi dengan kebolehpercayaan dan terlalu banyak maklumat. AFK melaporkan bahawa mereka menerima pertanyaan tentang maklumat kesihatan dalam talian. Kajian kuantitatif adalah 'cross-sectional descriptive study' dengan penggunaan borang soal selidik yang mengandungi 35 soalan, menyasarkan 300 AFK. Data dianalisa dengan menggunakan SPSS v20.0. 67 AFK memberi maklumbalas untuk kajian selidik pos, hanya 63 borang soal selidik boleh digunakan (21.0%). Secara keseluruhannya, responden menyatakan maklumbalas positif. 84.1% (n=53) bersetuju bahawa Internet member maklumat kesihatan yang berguna dan kemaskini; 76.2% (n=48) daripada mereka dapat mencari maklumat dengan mudah. Tiga jenis topik yang kerap dicari adalah berkaitan ubat-ubatan (n=46, 73.0%), penjagaan kesihatan (n=42, 66.7%), dan penyakit (n=37, 58.7%). Majoriti responden (n=40, 63.5%) menilai banyak maklumat kesihatan dari Internet untuk disaring sebagai halangan. Kesimpulannya, penemuan kajian ini menunjukkan bahawa AFK sangat berhubung dengan Internet untuk kegunaan profesional dan mereka menunjukkan sikap positif terhadap penggunaan. Walau bagaimanapun, terdapat halangan tertentu dilaporkan. Memandangkan AFK merupakan profesional kesihatan yang paling mudah diakses, mereka perlu mengukuhkan keupayaan mereka untuk memeluk dan menerima integrasi Internet dalam amalan farmasi, seterusnya membangunkan profesion farmasi yang lebih baik di Malaysia.

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ABSTRACT

Internet has become a common tool used by both healthcare professionals and the public to acquire up-to-date health-related information to improve their knowledge. Most of the studies described the growth of use of Internet around physicians, but information scarcity is reported around community pharmacists (CPs). Hence, this research was proposed in order to have better understanding of the current and future implications of Internet use for health information among Malaysian CPs. The objectives: (i) to explore CPs' perceptions on health-related information obtained from Internet; (ii) to identify the type of professional activities or online health-related information sought by CPs; and (iii) to investigate the barriers while retrieving online health-related information. Sequential exploratory mixed-methodology was adopted in this research, where phase-one was qualitative study and quantitative in phase-two, targeting CPs practising in Kuala Lumpur, Malaysia. Face-to-face interviews were adopted for qualitative study. Purposive and snowball sampling techniques were used to recruit participants. Upon participants' agreement, interviews were audio-recorded, transcribed verbatim and then analysed thematically. Phase-one consists of 11 participants and four major themes were identified. They claimed that the online health-related information is useful, easily accessible, and perceived that Internet is a unique source. Nevertheless, information should be obtained from established online sources. They expressed the need of training on information searching and website evaluation, and provision a list of

credentialed websites. The barriers encountered were correlated to the reliability and massive amount of information. CPs received enquiries from customers regarding online health-related information. Quantitative study was a cross-sectional descriptive survey, with a 35 items questionnaire targeting 300 CPs. The data were analysed using SPSS v20.0 67 CPs responded to the postal survey, yet 63 survey forms were usable (21.0%). Overall, the respondents expressed positive feedback. 84.1% (n=53) agreed that Internet provides useful and updated health-related information; 76.2% (n=48) of them were able to seek information effortlessly. The top three frequently searched topics were drug-related (n=46, 73.0%), general healthcare (n=42, 66.7%) and disease-related (n=37, 58.7%). Majority respondents (n=40, 63.5%) rated abundant health-related information to scan from the Internet as barrier. In conclusion, the findings showed that CPs are highly connected to Internet for professional use and they demonstrated positive attitudes towards its use. However, certain obstacles were reported. Since CPs are the most accessible healthcare professional, they should strengthen their capacity to embrace and adopt the integration of Internet into pharmacy practice, subsequently develop a better pharmacy profession in Malaysia.

CHAPTER 1
GENERAL INTRODUCTION

CHAPTER 1

GENERAL INTRODUCTION

1.1 Internet Accessibility

The first World Wide Web (WWW) Conference was held in Geneva in 1994 (Masters, 2008). Since 1995, Internet usage in the population as a whole has increased exponentially (Younger, 2010) and globally (Schiavo, 2008). This new digital technology becomes important in part of people's daily live around the world (Higgins, Sixsmith, Barry, & Domegan, 2011), as people subscribed to broadband reflecting their desire to take advantages of the potential of Internet (Schiavo, 2008).

As of end of June 2016, The Internet World Stats reported the estimation of 3.67 billion Internet users worldwide; where majority of the Internet users were located in Asia (49.6%). However, North America had the greatest penetration rate (89%) while the world average Internet penetration rate was 49.2%. Penetration rate refers to the percentage of the population who use the Internet (Higgins et al., 2011; Schiavo, 2008). The following table (Table 1.1) shows the statistics of worldwide Internet users by regions as of 30th June 2016 (Miniwatts Marketing Group, 2016).

Table 1.1. Worldwide Internet Usage

Regions	Internet Users	Internet Users (% of World)	Population	Penetration Rates
Asia	1,846,212,654	50.2%	4,052,652,889	45.6%
Europe	614,979,903	16.7%	832,073,224	73.9%
Latin America / Caribbean	384,751,302	10.5%	626,119,788	61.5%
Africa	340,783,342	9.3%	1,185,529,578	28.7%
North America	320,067,193	8.7%	359,492,293	89.0%
Middle East	141,489,765	3.8%	246,700,900	57.4%
Oceania / Australia	27,540,654	0.8%	37,590,820	73.3%
World Total	3,675,824,813	100%	7,340,159,492	50.1%

Updated: 30th June 2016; Reference: (Miniwatts Marketing Group, 2016)

1.2 Internet Use for Health-related Information

The Internet has become a treasure trove of information (Cheng & Lateef, 2014), and it was reported as world's largest online medical library (Muhamad, Afshari, & Mohamed, 2011). In recent years, Internet has developed as an important source for drug and health information (Chiu et al., 2009; Wong, Ko, & Sklar, 2009) due to its advantage of convenient accessibility, anonymity and widely available, with just a few taps on mobile devices such as smartphone, tablet or personal computer (Al-Farsi, Al Rahbi, & Chitme, 2014; Grossman & Zerilli, 2013; McMullan, 2006; Peterson-Clark, Aslani, & Williams, 2010; Scott, Gilmour, & Fielden, 2008; Tonsaker, Bartlett, & Trpkov, 2014). Internet has revolutionized, acting like an established media and a strategic channel to reach various kind of audiences globally

(Mo, 2012; Schiavo, 2008). Hence, there is an increasing number of people relying on Internet for obtaining information and other purposes (Cullen, 2002; Higgins et al., 2011). In fact, health information is one of the most commonly sought subjects on the Internet (McMullan, 2006).

Besides that, Internet plays an important role in terms of health education research and practice, as health educators wanted to develop and deliver effective health education to individuals as well as communities. Nevertheless, the advantages and issues with offering health education on Internet were acknowledged. The ubiquity of Internet has drastically reduced the expenditure to access health knowledge, hence accelerating the acquisition of knowledge by vast majority (Mo, 2012). In addition, it is ideal to use Internet to disseminate and deliver health-related information to particular population as it provides vast information privately and instantaneously with diverse perspectives (Mo, 2012; Muhamad et al., 2011). The anonymity of Internet allows individuals to seek for sensitive health-related information, such as human immunodeficiency virus (HIV). Despite its potentials, significant obstacles were reported. For instance, the availability of Internet connection, the elderly and people with economically disadvantages and less educated are less likely to benefit from online health information and more vulnerable to misinformation. Another concern is the accuracy of online health information, because any individual can post non-evidence based information on Internet. Furthermore, the unnamed nature of Internet might cause dishonest identities where people might claim themselves as subject expert (Mo, 2012).

1.2.1 Consumer's Profile

Traditionally, the public obtained information through pamphlet or paper resources, family and friends. For example, pamphlet is one of the resources to provide information and to reinforce doctor's explanation and advice (Chiu et al., 2009; Hartzband & Groopman, 2010). However, the transformation of Internet has upended the scenario, where everyone can easily access to almost borderless information that is available online with the use of search engines such as Google and Yahoo (Hartzband & Groopman, 2010), as well as to shares and communicates throughout the world (Mo, 2012). Many people might use Internet to make self-diagnosis before consulting professionals in crowded emergency departments or clinics (Tonsaker et al., 2014).

The introduction of Internet offers alternative way for the consumers to obtain health information (Mo, 2012). It provides wealth information to consumers and hence it becomes a favoured (Akhtari-Zavare, Ghanbari-Baghestan, Latiff, & Khaniki, 2015) and first source of health-related information rather than referring physicians (Akhtari-Zavare et al., 2015; Tonsaker et al., 2014). Literature had reported that Internet utilization for health-related information is the third most popular use after general browsing and email among Canadian Internet users (Schiavo, 2008). As of August 2012, it was estimated 85% of United States adult used Internet and approximately 80% Internet users searched online health information. In addition, survey from Pew Internet and American Life Project revealed that 34% Internet users read about health or medical issues while 24% consulted online reviews on certain medical treatment or medicine (Mo, 2012). Study conducted by Kratzke et al. showed the immense potential of Internet as an information source among college

woman for breast cancer prevention information (Kratzke, Amatya, & Vilchis, 2014). The type of online information is not restricted to disease diagnosis but there is an increasing search related to fitness, diet and exercise (Mo, 2012). Despite patients could expand and improve their understanding, knowledge and more informed about their conditions by referring online health information (Cheng & Lateef, 2014; Muhamad et al., 2011), poor knowledge and undeveloped search skills could lead to false beliefs (Cheng & Lateef, 2014).

1.2.2 Healthcare Professional's Profile

The use of Internet for online medical information is widely popular among healthcare professionals (Prendiville, Saunders, & Fitzsimons, 2009), as it is a useful tool to distribute medical research evidence and guidance (Davies, 2007). Since 1996, medical professionals have progressively referred online resources, when evidence-based medicine was defined (Younger, 2010) and studies had shown the increase trend for professional purposes such as obtaining medical and health information (Higgins et al., 2011; Lupiáñez-Villanueva, Ángel Mayer, & Torrent, 2009). A study had reported that 67% paediatricians used web-based resources as first “port of call” to search for clinical queries (Prendiville et al., 2009); whilst another study among nurses in New Zealand medical wards reported that almost all respondents (92.8%) accessed to online health information at home and work (Gilmour, Huntington, Broadbent, Strong, & Hawkins, 2012). Meanwhile, a study had demonstrated that the most popular medical resource was web portal, followed by online database and electronic journals, where all these three resources are Internet based (Chiu et al., 2009).

Internet offers a new opportunity for practitioners to overcome the problem of accessibility and provides them clinically endorsed health-related information (Cullen, 2002). They are routinely using the World Wide Web for information about diagnoses, to augment their clinical knowledge (Cheng & Lateef, 2014; Hartzband & Groopman, 2010), as well as to raise medical questions that need to be responded promptly (Prendiville et al., 2009). Besides, Internet offers physicians with immediate access to current information including primary resources, for example the journal articles and experts' evidence-based analyses that are readily available on professional societies websites and compendiums (Hartzband & Groopman, 2010).

In a systematic review regarding the use of Internet by doctors, the author had listed the encouraging factors for Internet usage, such as improves overall efficiency, enhances medical practice and delivers better care. Nevertheless, the factors that discourage the use of Internet include time, workload or effort, too much or confusing information, concerns of confidentiality and liability as well as lack of skills or technical difficulties. Other obstacles that were mentioned include navigation difficulties, slow download time, lack of awareness of valuable websites, lack of access, language barriers, no resource, lack of trusted websites, and software incompatibilities. The same systematic review reported that some researchers studied the correlation between Internet usage and age, it was found that younger doctors use Internet regularly, though other studies reported no association. This review also showed that apart from using email, Internet serves as a library for doctors, where doctors visit some of the popular websites such as PubMed, WebMD and Medscape (Masters, 2008).

1.3 Internet Usage in Malaysia

The Malaysian Communications and Multimedia Commission (MCMC) had conducted a series of purpose built surveys on Internet users in 2014. According to the report, the percentage of Internet users in Malaysia as of first quarter in 2014 is 66.6% (Malaysian Communications and Multimedia Commission, 2014). Meanwhile, the percentage of Internet users in 2015 was 77.6%, with a remarkable hike of 11%, and the number of Internet users was approximately 24.1 million in year 2015 (Malaysian Communications and Multimedia Commission, 2016).

In terms of Internet usage among Malaysian consumers, the trend of using Internet to manage healthcare and to study about diseases is gradually becoming more important due to the increase prevalence of chronic diseases, particularly among the urban women and the desire to stay healthy (Ahadzadeh, Sharif, Ong, & Khong, 2015). A study showed that about 22.5% breast cancer survivors in Peninsular Malaysia used Internet to search for breast health issues (Muhamad et al., 2011). Besides, Internet appears to be the second most frequently visited source for breast cancer prevention information after family or friends among the female staff of University of Malaya, Malaysia (Akhtari-Zavare et al., 2015).

1.4 Problem Statement

In the view of the emergence of Internet as a major health resource (Mo, 2012), various studies were performed to explore healthcare professionals' perspective that ranged widely in their methodology and terminologies (Bennett, Casebeer, Kristofco,

& Strasser, 2004; Gilmour et al., 2012). At present, little to no research has been carried out to study the use of online health information among Malaysian community pharmacists. The community pharmacists are practising in an information technology-rich society and yet very little attention is given to study the influence of Internet use for health-related information. Furthermore, the existing studies and published literatures are heavily based outside of Malaysia. In the light of extensive availability of online health-related information yet paucity of empirical study that describes the employment of Internet technology in pharmacy practice, this research was proposed. It is crucial to gain insight and fill the gap in current knowledge of Malaysian community pharmacists with the incorporation of Internet into their daily healthcare practice, in terms of their perception towards the health information obtained from World Wide Web, the health-related topic sought by community pharmacists, as well as the obstacles with accessing online health resources.

1.5 Rationale of the Study

Healthcare professionals are strategically positioned to assist their patients or consumers in seeking, choosing and interpreting health-related information from the Internet (Peterson-Clark et al., 2010). The United Kingdom's (UK) community pharmacies found that with the use of Internet technologies in practice could improve problem of isolation, self-confidence and perceived lack of clinical knowledge. Thus, the pharmacists have to be competent in utilizing Internet technologies to identify and evaluate the quality of online health-related information (Bearman, Bessell, Gogler, & McPhee, 2005). Moreover, the range of online resources is massive; resource selection and search skills are potential challenges to the pharmacists.

Therefore, this research was proposed by using mixed methods approach to assess community pharmacists' perception with regard to online health-related information based on the following justification:

1.5.1 The Role of Community Pharmacists

Community pharmacists are recognized as the most accessible healthcare professionals to consumers and patients (Beshir & Hamzah, 2014; Beshir & Hanipah, 2012; Hassali, Awaisu, Shafie, & Saeed, 2009; Hassali, Subish, Shafie, & Ibrahim, 2009; Jaradat & Sweileh, 2003; Lupiáñez-Villanueva et al., 2009; Shcherbakova & Shepherd, 2014) hence they could provide public health interventions more conveniently compared to other healthcare professionals (Beshir & Hanipah, 2012; Hassali, Subish, et al., 2009). At the same time, community pharmacists are equipped with proper drug information resources serve as a valuable source to other healthcare professionals, including general practitioners (Hassali, Khan, & Shafie, 2010; Jaradat & Sweileh, 2003). Globally, the general public is approaching pharmacists as they are positioned as professional health-related advisors and are acknowledged as highly reliable sources for medication-related information (Beshir & Hanipah, 2012; Hassali, Awaisu, et al., 2009; Hassali, Subish, et al., 2009; Jaradat & Sweileh, 2003). Furthermore, community pharmacists become first point of contact in healthcare by the public for non-prescription products, because they serve as “gatekeeper” and strategically positioned in healthcare system for those self-medicating consumers (Sarrieff, Nordin, & Hassali, 2012).

The role of community pharmacists has expanded from their traditional responsibility for preparing and dispensing medications (Bearman et al., 2005) to influencing the prescribing process and provision of pharmaceutical care (Hassali, Awaisu, et al., 2009). They potentially modify public health risk behaviours due to frequent contact with people (Paul, Walsh, & Tzelepis, 2005). The impacts with patient-centric roles of community pharmacists are optimistic, including improve patient's drug usage, health outcomes and quality of life (Sarrieff et al., 2012). Furthermore, the pharmacists can increase the quality use of medicine and medication safety by leveraging online health-related information, as the public might expect pharmacists to do so (Bearman et al., 2005).

1.5.2 Community Pharmacists' Challenges

The community pharmacists face challenges day in day out. For example, the rapid advancement of medicine information and proliferation of novel drug launched in the market, as well as drugs that are discontinued or withdrawn from market (Al-Farsi et al., 2014; Jaradat & Sweileh, 2003). Due to the availability of Internet, they were confronted with queries from technology-savvy patients (Iwanowicz, Marciniak, & Zeolla, 2006), and the public has increased awareness about their prescribed medicine (Al-Farsi et al., 2014). As the public is referring to the Internet as primary information source, pharmacists could educate consumer on the approach to evaluate the information obtained and clarify potentially misleading information (Sanders & Steigerwalt, 2012).

They also encountered a variety of drug-related questions during their practice, such as drug dosage, availability, adverse drug reactions, drug interaction, pharmacotherapy, drug toxicity, contraindication, mechanism of action, and route of administration. Hence, it is crucial for the community pharmacists to prepare themselves with updated knowledge and readily to access evidence-based medicine information. At the same time, they should know how to identify high-quality health-related websites and look for the pertinent information, having the capability in recognizing the potential limitations and pitfalls of web-based health information as well as applying the online health information on their customers or patients respectively (Al-Farsi et al., 2014; Iwanowicz et al., 2006; Jaradat & Sweileh, 2003). With the availability of these reference resources, community pharmacists are able to effectively provide information regardless of the complexity of the clinical-related queries and reduce medication errors (Al-Farsi et al., 2014).

1.5.3 Community Pharmacists in Malaysia

The World Health Organization (WHO) stated that pharmacists must possess certain knowledge, skills, behaviours and attitudes in support their role (Sarrieff et al., 2012). The Community Pharmacy Benchmarking Guidelines, produced by Pharmaceutical Services Division, Ministry of Health Malaysia had stated that community pharmacist do play an important role in terms of health promotion; where they promote, maintain and improve the overall health of communities (Pharmaceutical Services Division Ministry of Health Malaysia, 2015). According to the Malaysian Community Pharmacy Guild website, about one-third of approximately 13,147 registered pharmacists in Malaysia are practising in community pharmacies as of

September 2015 (Malaysian Community Pharmacy Guild, 2016). It was reported that the community pharmacists are regarded as consumers preferred choice for primary care in Malaysia, thus they should be able to distinguish the lay and scientific literature to provide accurate drug information to consumers (Hassali et al., 2010).

Therefore, based on the above-mentioned justification, this research will provide a more comprehensive framework to understand the online health information seeking journey among Malaysian community pharmacists, as well as the current usage and future implications of Internet use for health-related information. The proposed study site of this research is the capital city of Malaysia, where community pharmacists practising in Federal Territory of Kuala Lumpur were targeted for this research. This is because Kuala Lumpur (KL) is the nation's capital city and the biggest city in Malaysia. On top of that, Kuala Lumpur is the centre for various socio-economic activities involving finance, business administrative, education, sports, religion and culture (Kuala Lumpur City Hall, 2016).

1.6 Study Objectives

The general objective of this research is to assess the perception towards online health-related information among community pharmacists practising in Federal Territory of Kuala Lumpur, Malaysia.

The specific objectives of this research are:

- i) To explore the community pharmacists' opinions on the use of Internet for health-related information;
- ii) To identify the types of online health-related information or professional activities carried out by community pharmacists;
- iii) To investigate the barriers encountered by community pharmacists while accessing health-related websites or online health-related information.

1.7 Significance of the Study

Generally, this research will contribute to the understanding about the utilization of Internet for health-related information among Malaysian community pharmacists, including the awareness of online resources and the ability of retrieving online health information. Additionally, the findings from this study could benefit in other ways: -

- i) The findings could estimate the prevalence of Internet use for health-related information by community pharmacists practising in Kuala Lumpur.
- ii) This study could explore the potential benefits and impact of online health-related information as an information resource in community pharmacist's professional practice.
- iii) Data regarding the type of activities and information sought as well as the frequency of Internet use for health-related information could document the implication of Internet usage in community pharmacist's daily practice.
- iv) The information on the difficulties and challenges faced by community pharmacists during their search for online health-related information

could help the pharmacy advocacy organisation or pharmacy regulatory agencies to understand the current situation.

- v) The findings could help professional pharmacy associations to create awareness and reinforce the use of Internet for health-related information, such as enhance online health-related information literacy skill, develop the evaluation skill, promote critical appraisal and interpret pertinent online health information.
- vi) The suggestions and recommendations provided by community pharmacists may serve as a reference to healthcare organisation or policymakers for the pharmacy profession development, such as supporting the use of online health-related information in pharmacy practice, education programme or even curriculum of pharmacy undergraduate course.

CHAPTER 2
LITERATURE REVIEW

CHAPTER 2

LITERATURE REVIEW

2.1 Drug Information Resources

The amount of medical information is increasing and there are plenty of available resources that help to answer drug-related enquiries (Sanders & Steigerwalt, 2012). Generally, there are three categories of drug information source that are available to pharmacists: primary literature, secondary literature and tertiary literature (Al-Farsi et al., 2014; Brunetti & Hermes-DeSantis, 2010; Hassali et al., 2010; Iwanowicz et al., 2006; Jaradat & Sweileh, 2003; Sanders & Steigerwalt, 2012).

Primary literature source refers to original publication that has not been altered or interpreted by others (Iwanowicz et al., 2006). The primary literature contains update and cutting-edge information, including research articles that published in scientific journals. The secondary literature is useful for immediate and selective screening of primary source, including abstracting services and bibliographic indexing (Al-Farsi et al., 2014). Tertiary literature source acts as core body of knowledge developed by collecting data and concepts drawn from primary literature resources (Iwanowicz et al., 2006). Tertiary literature is the most commonly referred source, due to its convenience and easy to access for consistent information, such as books, monographs and review articles (Al-Farsi et al., 2014). The drug information resources are summarized in Table 2.1.

Table 2.1. Drug Information Resources

	Primary Literature	Secondary Literature	Tertiary Literature
Description	The publication of novel research, which has not been altered or interpreted by others	Resources that provide access to primary literature	Fundamental of knowledge developed by integrating the information gained from primary literature
Examples	Clinical trials or research, scientific journal articles that report case studies' result	Bibliographic, indexing and abstracting databases, e.g. PubMed	Drug monograph collection, reference books, review articles
Advantage	Original and present information	Effective access to the primary literature	Easy and convenient to use; Usually the information is well established
Limitation	Users need to possess knowledge on scientific methods and statistics in order to interpret the information properly	Users need to be proficient with searching electronic database; expensive to obtain and maintain	The information might be out-of-date because of the gap when resource is written and published
When to Refer	To search for most up-to-date information	To locate primary literature	To seek for quick answer or to find background information

References: (Iwanowicz et al., 2006; Jaradat & Sweileh, 2003)

One of the drug information resources is Internet. Generally, the Internet-based health information could be accessed from variety of sources, such as websites owned by organisations or individual doctor, online support groups that allows people to exchange health information, or blogs which authored by health advocates or caregivers (Higgins et al., 2011). It was suggested that the healthcare professionals should familiarize themselves with these web-based resources by carefully select and evaluate online health-related information prior to use, as a consequence they may be able to navigate through health-related websites in a more efficient manner and possibly smoothen their information collection journey and decision-making activity (Grossman & Zerilli, 2013).

Healthcare professional could search health and drug-related information via search engines such as Google and Yahoo (Brunetti & Hermes-DeSantis, 2010; Iwanowicz et al., 2006). The most frequently visited search engine is Google as information could be retrieved quickly and accurately when the user enters the keywords. The use of search engines for online health information is ranked as the third most common use of Internet after email and product research. On the other hand, Wikipedia (Wikipedia, 2017) is quite popular for its ability to provide drug and health-related information yet the information published on Wikipedia is user-edited and might cause problem of errors of omission (Brunetti & Hermes-DeSantis, 2010; Grossman & Zerilli, 2013). By comparing Wikipedia with Medscape Drug Reference, it was found that Wikipedia showed 20% less complete of answering drug information enquiries, and it did not provide sufficient information on drug dosing (Brunetti & Hermes-DeSantis, 2010). However, literature had reported that healthcare professionals refer Wikipedia as it appears on the top of search results in majority

search engines for drug information and general health topics (Grossman & Zerilli, 2013).

There are quite a lot of useful health-related websites that provide free access for good quality of health and drug-related information. Few articles had described some of the open-access or free health-related websites that deliver enormous information, including basic list of self-care resources; herbal and dietary supplement resources (Brunetti & Hermes-DeSantis, 2010; Grossman & Zerilli, 2013; Iwanowicz et al., 2006; Jaradat & Sweileh, 2003; Lapidus & Dryankova-Bond, 2014; Sanders & Steigerwalt, 2012). These websites are summarised in Table 2.2. Most of the listed websites are available without the need of registration unless stated otherwise, such as Medscape (Medscape, 2017), which requires a simple registration procedure (Iwanowicz et al., 2006).

Table 2.2. Open-Access Health-related Websites

No.	Websites / Web Address (URL)	Key Feature(s)
1.	Academy of Managed Care Pharmacy http://www.amcp.org	The Academy of Managed Care Pharmacy (AMCP) is a professional association dedicated to increase patient access for affordable medicines, and to improve health outcomes.
2.	American Society of Health-System Pharmacists (ASHP) https://www.ashp.org	Main focus on pharmacists in acute and ambulatory settings, and emphasises on efforts to improve medication use and enhance patient safety.
3.	Centers for Disease Control and Prevention https://www.cdc.gov/	Established to increase American's health awareness, currently CDC offers health information ranging from newly discovered health threats to cutting edge medication.
4.	ClinicalTrials.gov https://clinicaltrials.gov	Databases of privately or publicly funded studies conducted around the world on wide range of diseases and conditions, and are supported by National Library of Medicine (NLM) and National Institute of Health (NIH).

No.	Websites / Web Address (URL)	Key Feature(s)
5.	Cochrane Trusted evidence. Informed decisions. Better health. http://www.cochrane.org	Maintained by a global independent network of researchers, professionals, patients, carers, and people interested in health, consists of 37,000 contributors across 130 countries. Its main purpose is to leverage the power of crowd source and produce credible, accessible and unbiased health information that is free from commercial sponsorship and any conflict of interest.
6.	DailyMed https://dailymed.nlm.nih.gov/dailymed/	The official provider of FDA labeling which is commonly found in medication package inserts. It is the “go-to” source for trustworthy information, as it offers up-to-date and comprehensive resource that can be easily looked up and downloaded.
7.	Drug Information Portal – U.S. National Library of Medicine – Quick Access to Quality Drug Information http://druginfo.nlm.nih.gov/drugportal/drugportal.jsp	A portal to more than 49,000 types of drugs via an intuitive search engine, where the drugs information is extracted from U.S. National Library of Medicine.

No.	Websites / Web Address (URL)	Key Feature(s)
8.	Drugs and Supplements - Drugs and Supplements – Mayo Clinic https://www.mayoclinic.org/drugs-supplements	A non-profit organisation on the web with the vision to provide credible information, and make contribution to health and well being of every patient through integrated clinical practice, education and research.
9.	Medline Plus – Health information from the National Library of Medicine https://www.medlineplus.gov	MedlinePlus is produced by the National Library of Medicine (world’s largest medical library). It offers up-to-date and reliable health information, such as information about diseases, conditions, and wellness issues. Users can learn about latest treatment and search information about supplement or drug, view medical videos or illustration, obtain links to latest medical research or search clinical trials on a disease.
10.	Drugs, Herbs and Supplements: MedlinePlus https://medlineplus.gov/druginformation.html	For user to learn about their over-the-counter medicines and prescription drugs such as special precaution, side effects, dosage and etc.; as well as to search for herbal remedies and dietary supplements and to learn their drug interaction, usual dosage and more.
11.	Drugs@FDA: FDA Approval Drug Products https://www.accessdata.fda.gov/scripts/cder/daf/	Provide information about FDA-approved generic prescription and brand name, as well as the over-the-counter biological therapeutic products and human drugs.

No.	Websites / Web Address (URL)	Key Feature(s)
12.	Health Information Translations – Quality health education resources for diverse populations. https://www.healthinfotranslations.org	This website provides health care professional and those working in communities yet with limited English proficient populations with plain language health education resources.
13.	Hazardous Substances Data Bank (HSDB) https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm	Hazardous Substances Data Bank (HSDB) is a toxicology database that provides toxicity data of potentially hazardous chemical. It also contains information on industrial hygiene, regulatory requirements, human exposure, nanomaterials, emergency handling procedures, detection methods, environmental fate and related areas. The information is fully referenced and reviewed by a Scientific Review Panel.
14.	Institute for Safe Medication Practices http://ismp.org	<p>Institute for Safe Medication Practices (ISMP) is a non-profit organisation dedicated about safe medication use and medication error prevention. It helps healthcare practitioners to keep patients safe and lead efforts to improve medication use process.</p> <p>The continuously expanding knowledge on medication safety drives ISMP's initiatives to improve medication use process, where these initiatives fall into 5 key areas: communication, education, knowledge, cooperation and analysis.</p>